

WHAT IS CLAIMED IS:

1. An optical device package which comprises:

a) a substrate having an upper surface and an elongated linear groove for receiving an optical fiber;

b) an optical fiber positioned within the groove in said substrate and having a top surface; and,

c) a frame sealed to the upper surface of the substrate and having a flat bottom surface, the top surface of the optical fiber being at or below the level of the bottom surface of the frame.

2. The optical device package of claim 1 further comprising a lid.

3. The optical device package of claim 2 wherein the frame comprises a single piece member having a band-like structure defining an opening.

4. The optical device package of claim 3 wherein the lid comprises a plate of fluid impervious material, the plate being bonded to the frame so as to cover the opening of the frame.

5. The optical device package of claim 4 wherein the fluid impervious material is selected from the group consisting of silicon, glass, ceramic and metal.

5 6. The optical device package of claim 1 wherein the substrate has a distal end and a proximal end and the optical fiber extends from the recess to at least the distal end of the substrate.

10 7. The optical device package of claim 3 wherein the substrate has a distal end, a proximal end, and a recess for receiving an optical semiconductor component, the recess extending to the proximal end of the substrate.

15 8. The optical device package of claim 7 wherein the frame includes a projection dimensioned and configured to engage the recess.

9. The optical device package of claim 1 wherein the substrate is fabricated from single crystal silicon.

10. The optical device package of claim 1 further including an optical semiconductor component mounted to the substrate.

5 11. The optical device package of claim 10 wherein the optical semiconductor component is selected from the group consisting of a laser diode, light emitting diode and photodetector.

10 12. The optical device package of claim 10 wherein the optical semiconductor component has an active area positioned below the upper surface of the substrate.

15 13. The optical device package of claim 10 wherein the optical semiconductor component has an active area positioned at or above the upper surface of the substrate, and the substrate possesses a reflecting surface for reflecting optical signals between the optical fiber and the active area.

14. An optical device package which comprises:  
a) a substrate having an upper surface and an elongated linear groove for receiving an optical fiber;

b) an optical fiber positioned within the groove in said substrate and having a top surface; and,

c) a frame sealed to the upper surface of the substrate and having a flat bottom surface, the frame being a single piece member having a band-like structure defining an opening, the top surface of the optical fiber being at or below the level of the upper surface of the substrate.

15. A method for making an optical device package comprising:

a) providing at least one substrate having an upper surface, a distal end and a proximal end, the substrate having a recess and a linear groove extending between the distal end of the substrate and the recess;

b) mounting an optical fiber in said groove, the optical fiber having an optical axis, said optical fiber having a top surface and being mounted in the linear groove of the substrate;

c) forming at least one electrical lead on the substrate, the electrical lead extending at least from the recess to the proximal end of the substrate; and,

5 d) fixedly mounting a frame having an opening to the upper surface of the substrate the frame having a top surface and a flat bottom surface, the frame being mounted such that the opening is positioned over at least a portion of the recess in the substrate and the bottom surface of the frame is at or above the level of the top surface of the optical fiber.

16. The method of claim 15 further including the steps of:

10 mounting an optical semiconductor component to the substrate such that the optical semiconductor component is at least operatively aligned with the optical axis of the optical fiber; and

15 fixedly mounting a lid to the upper surface of the frame.

17. The method of claim 15 wherein the substrate is single crystal silicon and the upper surface is in the (100) crystallographic plane.

20 18. The method of claim 17 wherein the step of providing a substrate comprises forming the recess and

linear groove by masking the silicon substrate and  
etching the silicon substrate in the (111)  
crystallographic planes.

5 19. The method of claim 16 wherein the step of  
mounting the semiconductor device is performed after the  
step of fixedly mounting the frame to the upper surface  
of the substrate.

10 20. The method of claim 15 wherein the step of  
fixedly mounting the frame to the substrate is performed  
by bonding the frame to the substrate with a material  
selected from the group consisting of solder metal,  
solder glass frit, BCB and epoxy resin.

15 21. The method of claim 15 wherein the step of  
providing a substrate comprises providing a silicon  
wafer, masking and etching the wafer to form a plurality  
of recesses and grooves, and dividing the wafer into  
individual substrates, each substrate having at least one  
recess and at least one groove.

22. The method of claim 21 wherein the step of dividing the wafer into individual substrates comprises cutting the wafer with a dicing saw.